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| 09/856,561      | 12/05/2001  | Yin-Ming Li          | 1797-0160001        | 3573             |

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EXAMINER

IBRAHIM, MEDINA AHMED

| ART UNIT | PAPER NUMBER |
|----------|--------------|
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1638

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DATE MAILED: 02/24/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/856,561

Applicant(s)

LI ET AL.

Examiner

Medina A Ibrahim

Art Unit

1638

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 11 January 2002.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☐ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-16 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 December 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☒ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 5.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

### **DETAILED ACTION**

Claims 1-16 are pending and are under examination.

#### ***Drawings***

The drawings filed with this application are approved by the Examiner.

#### ***Information Disclosure Statement***

The information disclosure statement (IDS) submitted on 02/14/02 is being considered by the Examiner. However, the International Search Reports PCT/US99/26443 and PCT/ US 99/27731, and the US patent application no 09/437, 607 listed as references in page 10 of the IDS will not be published on the face of the patent because they are inappropriate references for publication on the face of the patent.

#### ***Oath/Declaration***

1. The oath or declaration is defective. A new oath or declaration in compliance with 37 CFR 1.67(a) identifying this application by application number and filing date is required. See MPEP §§ 602.01 and 602.02.

The oath or declaration is defective because: the oath, declaration or application data sheet does not acknowledge the filing of provisional application no. 60/109, 427. A new oath, declaration or application data sheet is required in the body of which the present application should be identified by application number and filing date.

#### ***Specification***

1. This application does not contain an abstract of the disclosure as required by 37 CFR 1.72(b). An abstract on a separate sheet is required.

***Claim Rejections - 35 USC § 112***

1. The following is a quotation of the **second** paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 7 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 7 is indefinite because a soil that is "acidified" is open to individual interpretations, depending upon the initial pH. While clarification is required, new matter should be avoided.

3. The following is a quotation of the **first** paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 6, 10 and 14-15 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

The claims are drawn to a method of recovering cadmium and/or zinc from Cd and/or Zn containing soil by cultivating *T. caerulea* G15, the seeds of which have deposited under ATCC accession no. 203439, *T. caerulea* G15 plant and seeds.

Since the seed claimed is essential to the claimed invention, it must be obtainable by a reproducible method set forth in the specification or otherwise be readily available to the public. The statement on page 9, 2<sup>nd</sup> full paragraph, of the specification

indicating that the seed of the *T. caerulescens* G15 has been deposited under the terms of the Budapest Treaty is noted. However, a statement by an attorney of record over his or her signature and registration number, stating that the seed will be irrevocably and without restriction or condition released to the public upon the issuance of a patent, would satisfy the deposit requirement made herein. See 37 C.F.R. 1.808-1.809 for additional explanation of these requirements.

#### ***Scope of Enablement***

4. Claims 1-5, 7-9, 11-13 and 16 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for a method of recovering cadmium and/or zinc from Cd/Zn contaminated soils by cultivating the *Thlaspi caerulescens* of G15 genotype, does not reasonably provide enablement for a method of recovering Cd and/or Zn by cultivating any *Thlaspi caerulescens* plant and said plant that is isolated. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention commensurate in scope with these claims.

The claims are broadly drawn to a method of recovering cadmium and/or zinc from soil containing Cd/Zn by cultivating at least one of any *Thlaspi caerulescens* plant on said soil, wherein the plant accumulates from about 1000 mg to about 6000 mg of Cd/kg and/or from about 15,000 mg to about 30,000 mg Zn/kg in above ground tissues (dry wt) to obtain a zinc and/or cadmium containing ore. The claims also encompass treating the soil with chloride prior to cultivation of the plant, and isolated *Thlaspi*

*caerulescens* plant that accumulates said Cd and/or Zn concentrations in aboveground tissues.

Applicant has provided guidance for the isolated plant and seed of the *Thlaspi caerulescens* G15 genotype, the seed deposited under the accession no. 20349, and a method for using said *Thlaspi caerulescens* G15 plants to recover Cd and/ or Zn from Cd/Zn contaminated soil. The specification disclosed 20 genotypes of *T. caerulescens* from different contaminated soils; said plants were grown hydroponically on a nutrient solution containing various concentrations of Cd and Zn with chelating agents. After twelve weeks, shoots and roots of each plant were harvested and analyzed for Cd and Zn concentrations. Several of the cultivars were also cultivated on Zn contaminated soils. The results obtained in both experiments revealed a wide range of Cd/ Zn accumulation and tolerance from different *T. caerulescens* genotypes. Of the 20 genotypes, only the *T. caerulescens* G15 genotype was shown to have the ability to accumulate from 0.1% to 0.6% (6000 ppm) of Cd and/or at least 18,000 mg/kg of Zn in its aboveground tissues on dry wt basis (Figs. 1 and 2), without any damage to the plant.

Applicant has not provided guidance other than *T. caerulescens* G15 having the metal-accumulating property as recited in the claims, or a method for using other than *T. caerulescens* G15 plants to effectively recover 0.1% to 0.6% of Cd and/or 1.5% to 3% of Zn. No guidance has been provided for how to select genotypes that may be suitable in Applicant's method so that the desired amount of Zn and Cd can be recovered, without injury to the plant.

The state of the art as evidenced by Salt et al (Biotechnology, vol. 13, pp. 468-474, 1995, Applicant's IDS) teaches that the ability of a plant to accumulate heavy metals is a genotype dependent and varies greatly between species and between cultivars within the species (page 469, column 2, Phytoextraction). Therefore, absent any specific guidance on how to identify or select a suitable genotype, one skilled in the art would not be able to use any *T. caerulescens* to extract the desired amount of Cd and/or Zn, without undue experimentation.

Therefore, given the lack of guidance in Applicants' specification regarding other *Thlaspi caerulescens* plant cultivars having the claimed metal accumulating property, the lack of guidance regarding how to select a suitable genotype that can be used in Applicant's method, and the state of the art, the claimed invention is not enabled throughout the broad scope.

***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-4, 7-9, 11-13 and 16 are rejected under 35 U.S.C. 102(b) as anticipated by Brown et al (Soil Sci. Soc. Am. J. vol. 59:123-133, 1995, Applicant's IDS).

The claims are broadly drawn to a method of recovering cadmium and/or zinc from soils containing Cd/Zn by cultivating at least one of any *Thlaspi caerulescens* plant on said soil, wherein the plant accumulates from about 1000 to about 6000 mg of Cd/kg and/or 15,000 to about 30,000 mg Zn/kg in above ground tissue (dry wt) to obtain a zinc and/or cadmium containing ore. The claims also encompass acidifying the soil with chloride prior to cultivation, and isolated *Thlaspi caerulescens* plant that accumulates said concentrations of Cd and/or Zn in aboveground tissues.

Brown et al teach a method of using *Thlaspi caerulescens* in the phytorecovery of Cd and Zn from cadmium and zinc-contaminated media. *T. caerulescens* plants, together with non-metal accumulating plant species, were grown on nutrient solutions treated with various concentrations of Cd and Zn, to determine Zn and Cd accumulation and tolerance in each plant (page 126, Materials and Methods and Table 1). In one of the treatments, *caerulescens* plant s accumulated more than 25000 mg Zn/kg and 1000 mg Cd/Kg without effecting the plant growth and yield (see at least Results and Discussion on page 127). The reference teaches that specific genotypes of *T. caerulescens* may be strong candidates for the phytoremediation of Zn and Cd contaminated soils (Abstract). Since Brown et al teach a mature *T. caerulescens* plant, pollen and propagation material are inherently parts of the plant.



3. Claim 5 is rejected under 35 U.S.C. 102(b) as anticipated by Soriano et al (US Pat 4, 326, 884).

The claim is directed to a zinc and/or cadmium-containing ore produced through phytoremediation of Cd and/or Zn containing soils using *T. caerulea*.

Soriano et al teach zinc and cadmium containing ores. The claimed product is indistinguishable from those of the prior art; therefore, Soriano et al anticipate the claimed invention.

**Remarks**

No claim is allowed.

Papers related to this application may be submitted to Technology Sector 1 by facsimile transmission. Papers should be faxed to Crystal Mall 1, Art Unit 1638, using fax number (703) 308-4242. All Technology Sector 1 fax machines are available to receive transmission 24 hrs/day, 7 days/wk. Please note that the faxing of such papers must conform with the Notice published in the Official Gazette, 1096 OG 30 (November 15, 1989).

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Medina A. Ibrahim whose telephone number is (703) 306-5822. The Examiner can normally be reached Monday-Thursday from 8:30AM to 5:30PM and every other Friday 9:00AM to 5:00PM.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Amy Nelson, can be reached at (703) 306-3218.

Any inquiry of a general nature or relating to the status of this application should be directed to the receptionist whose telephone number is (703) 308-0196.

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Mai



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